

Challenge 7 Force Sensor Calibration

Learning outcomes: Students will know how and be able to ...

- conduct calibration of an analog sensor
- demonstrate the use of bench instrumentation to collect the calibration data
 - by providing power to a third-party analog force gage
 - by collecting voltage output data from a third-party analog force gage

Background:

- Review the calibration example, see attached, to develop your own documented process for calibration
- examine the files attached
 - manual for the Vernier Force Gage
 - pinout guide from Vernier

Activity:

During Challenge 7, you are conducting a *multi-point static calibration of a force sensor*, specifically the Vernier Force Sensor. You have the freedom to develop your calibration process to determine the sensitivity of the force gage. You will be provided a set of masses. The lab instructors advise you to double check the mass values with a secondary source. The masses are what you can use to load and unload (and load and unload, etc) the force gage.

Minimum expectations, and you can exceed these expectations. Document your procedure. Include experimental setup with sketches, and any required calculations with full details of variable names defined, etc. Produce an Excel spreadsheet showing both the raw acquired data and the processed data.

The example for "calibration" describes how you can quantify the various uncertainties that can be determined during the sensor calibration. You would be well advised to also consider the uncertainties of the digital data acquisition process as well.

Please note you are encouraged to fully quantify the uncertainties for this experiment using the information from class notes about combining uncertainties.

Data Acquisition Options:

You could read the voltages into either the benchtop digital multimeter or the o-scope (or BOTH for independent verification). With this option, you will use the benchtop DC power supply to offer the 5 volts to the force gage.

See the calibration demo from class with Mr. Hill. This might help you develop your method of data gathering.